

SHORT COMMUNICATION

Review of the genus *Prolactistes* (Heteroptera: Cydnidae), with two new combinations, first Indonesian records and a key to species of the genus

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Abstract. Two species of the genus *Paraethus* J. A. Lis, 1994 (Hemiptera: Heteroptera: Cydnidae: Cydninae: Geotomini) are transferred to *Prolactistes* J. A. Lis, 2001, resulting in the following new combinations: *Prolactistes jani* (J. A. Lis, 1995), comb. nov., and *Prolactistes lisi* (Magnien, 2014), comb. nov. Diagnostic characters for *Prolactistes*, and a key for its three species are provided. The present note also reports the first Indonesian record for *Prolactistes australis* J. A. Lis, 2001 (Ambon Island, Timor) and *P. lisi* (Ambon Island), both known previously only from Australia.

Key words. Hemiptera, Heteroptera, Cydninae, Geotomini, new combination, new record, Ambon Island, Timor Island, Indonesia, Australia

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Introduction

The genus *Paraethus* J. A. Lis, 1994 (Hemiptera: Heteroptera: Cydnidae: Cydninae: Geotomini) was erected for a single species, *P. ajmericus* J. A. Lis, 1994 from India (Lis 1994), and was regarded as closely related to the African genus *Geocnethus* Horváth, 1919, mainly due to the shape of the peritreme that bears an apical claw-like process. A second species of the genus, *P. jani* J. A. Lis, 1995, was subsequently described from Java, and based on the shape of male genitalia it was suggested that it has an intermediate position between *Geocnethus* and *Aethus* Dallas, 1851 (Lis 1995). Five Afrotropical species of the genus *Aethus* were later transferred to *Paraethus* (Lis 1995, 1996a), resulting in a genus of shared Afrotropical-Indomalayan distribution.

More recently MAGNIEN (2014) reviewed all species of *Paraethus* and described two new Afrotropical species (*P. riegeri* Magnien, 2014 from the Republic of the Congo and Uganda, and *P. raunoi* Magnien, 2014 from Mozambique) and another one from Australia (*P. lisi* Magnien, 2014, without exact locality). Moreover, MAGNIEN (2014) indicated that two species, *P. jani* and *P. lisi* differed from all other species of the genus by having a prolonged

apical outer part of the anterior tibiae extending beyond the tarsal insertion. Having in mind all those facts we realized that also *Prolactistes australis* J. A. Lis, 2001, described from Australia almost twenty years ago (Lis 2001), possessed highly similar anterior tibiae and peritreme. Therefore, we decided to compare specimens of the genus *Paraethus* and *Prolactistes* J. A. Lis, 1994 from the Indo-Australian Region. As a result, we found that two species of the genus *Paraethus*, i.e., *P. jani* and *P. lisi* are congeneric with *Prolactistes australis* and should be excluded from the former genus and transferred to *Prolactistes*. Moreover, we report the first records of *P. australis* and *P. lisi* from Indonesia.

Material and methods

Photographs were taken with a Moticam 1000 digital camera mounted to an Olympus SZX10 microscope using an Images Plus 2.0 software (Motic Asia, Hong Kong). Multiple focal planes were merged using Helicon Focus 7.6.3. software (Helicon Soft Ltd.).

The map used in the paper was made with Natural Earth, a free vector and raster map data (NATURAL EARTH 2020). In order to show records of studied species their localities



were georeferenced in Google Earth 9.3.115.1 (GOOGLE EARTH 2020), and the final map was prepared in ArcGIS 10.7.1 (ESRI 2020).

We follow LIS & PLUOT-SIGWALT (2002) for the terminology of cephalic chaetotaxy, PLUOT-SIGWALT & LIS (2008) and LIS et al. (2014) for the terminology of spermathecal structures and the paramere structures respectively, and KMENT & VILÍMOVÁ (2010) for the terminology of the external scent efferent system.

The material available for this study is deposited in the following collections:

ANIC Australian National Insect Collection, Canberra, Australia;
BPBC Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.;
IBUO Institute of Biology, University of Opole, Opole, Poland;
MAGNT Museum and Art Gallery of the Northern Territory Museum, Darwin, Australia;

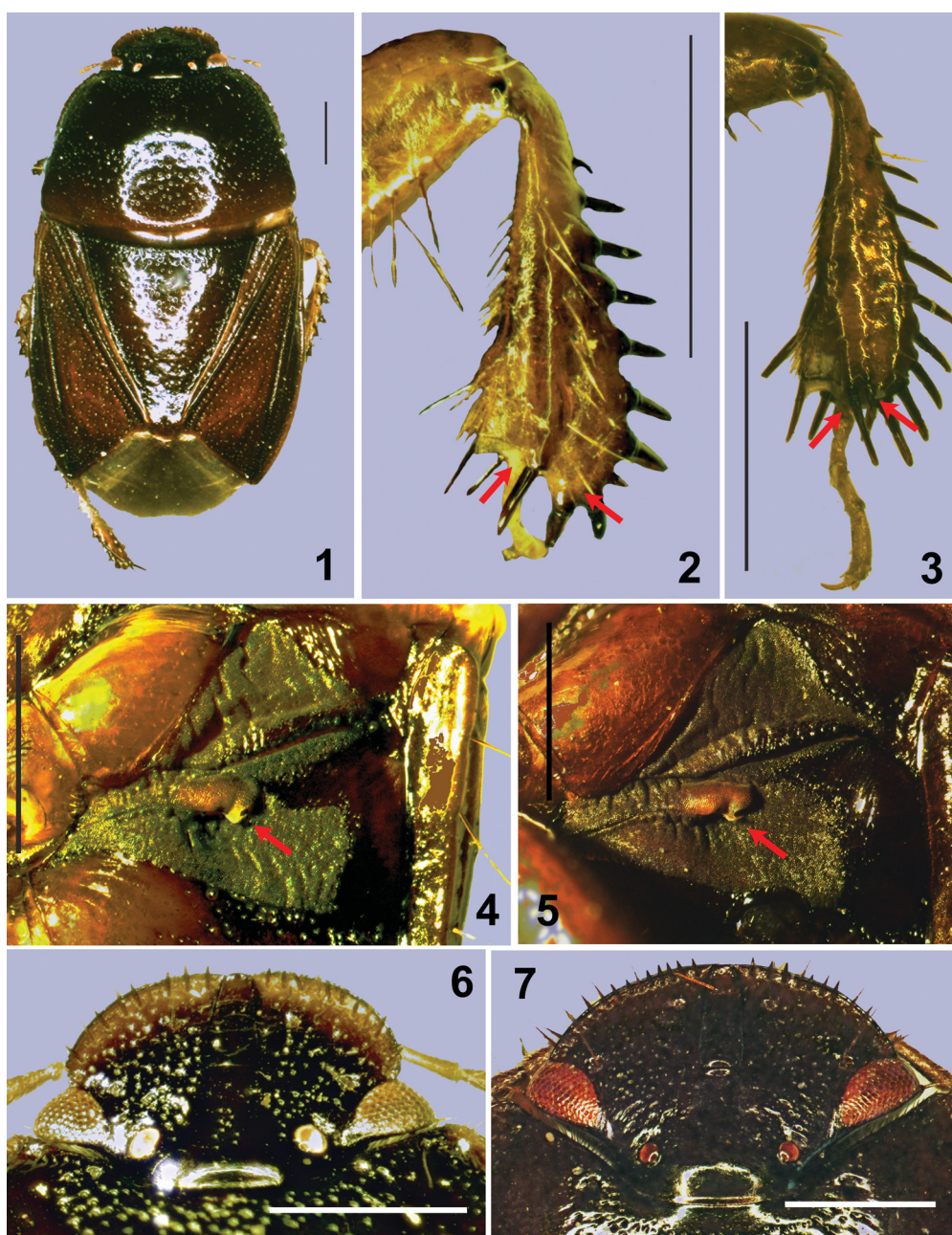
NBC Naturalis Biodiversity Center (former National Museum of Natural History), Leiden, the Netherlands.

Taxonomy

Prolactistes J. A. Lis, 2001

Prolactistes J. A. Lis, 2001: 103. Type species by original designation: *Prolactistes australis* J. A. Lis, 2001; GROSS & CASSIS (2002): 414 (catalogue of Australia); LIS & SCHAEFER (2005): 278, 280, 282 (tibial combs)

Diagnostic characters. Body elongate (Fig. 1); outer part of anterior tibia strongly produced beyond the point of tarsal insertion (Fig. 2); peritremal surface with claw-like process (Fig. 4); head with lateral margins flattened and upcurved (Fig. 6); its submargins, except for clypeus, with a row of 9–13 setigerous punctures bearing 6–11 peg-like



Figs 1–7. 1, 2, 4, 6 – *Prolactistes australis* J. A. Lis, 2001. 3, 5, 7 – *Paraethus capicola* (Westwood, 1837). 1 – dorsal habitus; 2, 3 – anterior tibia, arrows indicate the point of tarsal insertion (left) and the outer part of the anterior tibia (right); 4, 5 – evaporatoria of meso- and metathorax, arrows indicate the claw-like process of peritreme; 6, 7 – head, dorsal view. Scale bar = 1.0 mm.

setae and 2–4 hair-like setae (Fig. 6); antennae 5-segmented. For a detailed description of the genus, see LIS (2001).

***Prolactistes australis* J. A. Lis, 2001**

(Figs 1–2, 4, 6, 9, 12, 15, 17, 19, 21–22)

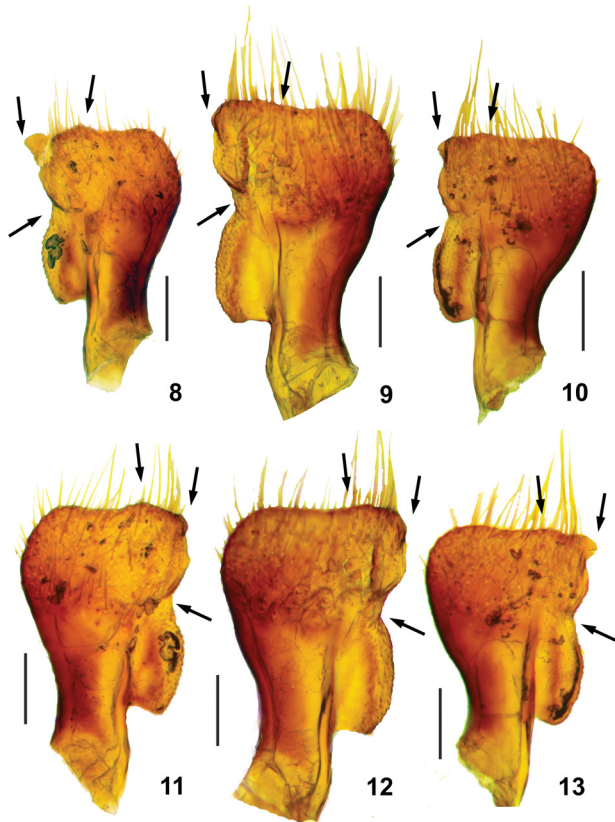
Prolactistes australis J. A. Lis, 2001: 106; GROSS & CASSIS (2002): 414 (catalogue of Australia); LIS & SCHAEFER (2005): 278, 280, 282 (tibial combs)

Type material examined. HOLOTYPE: ♂, Australia, Northern Territory, Nourlangie Ck., 8 km N. of Mt. Cahill (MAGNT). PARATYPES: 1 ♂, 12.51°S 132.47°E, 8 km E by N of Mt Cahill, N.T. (IBUO); 2 ♂♂, 12.48S 132.42E, Nourlangie Ck., 8 km N of Mt. Cahill, N.T., 16.vi.1973, T. Weir & T. Angeles (IBUO); 1 ♂, 18.06°S 144.50°E, Forty Mile Scrub N. P., 55 km SW by S of Mt. Garnet, QLD, 29–30. xi.1981, J. Balderson (ANIC).

Additional material examined. INDONESIA: AMBON ISLAND: Ambon I., 1 ♂ 1 ♀, 70 m, 13.v.1960, A. M. R. Wegner, Coll. Bishop Museum (BPBC, IBUO); Ambon I., Waai, 1 ♂ 1 ♀, 14.v.1960, at light, 1 ♂ 10.vii.1963, 1 ♂, 1.xi.1963, A. M. R. Wegner, Coll. Bishop Museum (BPBC, IBUO). TIMOR ISLAND: Timor I., Balical 260–300m, 1 ♂ 1 ♀, 14–24.xii.1963, J. Sedlacek Collector, Bishop (BPBC).

Differential diagnosis of male. Blade of paramere clearly separated from the outer lobe by a distance and its upper edge blunt and directed downward (Figs 9, 12); second conjunctival appendages of aedeagus apically slightly recurved (Fig. 15); opening of male genital capsule with elongated sharpened teeth at the inner margins (Fig. 17); proctiger short, about 1.2 times longer than wide, straight on its apical margin (Fig. 19).

Differential diagnosis of female. Spermathecal seminal receptacle rounded (Figs 21–22).



Figs 8–13. 8–10 – paramere in ventral view; 11–13 – paramere in dorsal view. 8, 11 – *Prolactistes jani* (J. A. Lis, 1995); 9, 12 – *P. australis* J. A. Lis, 2001; 10, 13 – *P. lisi* (Magnien, 2014), arrows indicate the differences between the species. Scale bar = 0.1 mm.

Note. For a detailed description of the species, see LIS (2001).

Distribution (Fig. 25). Australia (Northern Territory, Queensland) (LIS 2001; GROSS & CASSIS 2002); Indonesia (Ambon Island, Timor) (new country record).

***Prolactistes jani* (J. A. Lis, 1995), comb. nov.**

(Figs 8, 11, 14)

Paraethus jani J. A. Lis, 1995: 53; MAGNIEN (2014): 137, 138 (key to species), 140 (tibia, paramere), 141–142 (comparison with *P. lisi*).

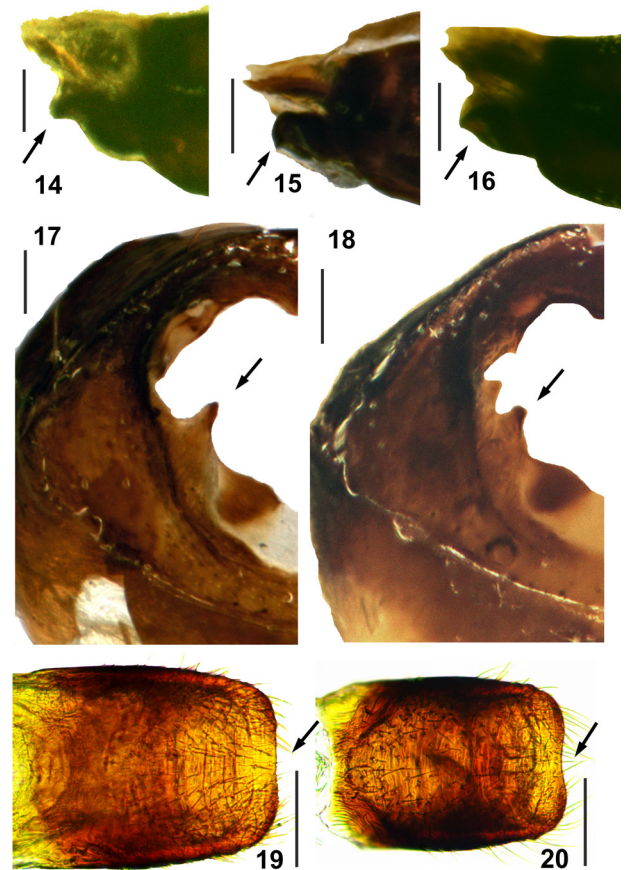
Type material examined. HOLOTYPE: ♂, Indonesia: Java, Semarang, viii.1909, E. Jacobson (NBC). PARATYPES: 2 ♂♂ 1 ♀, as holotype (NBC, IBUO).

Differential diagnosis of male. Blade of paramere separated from the outer lobe by a slight incision and its upper edge sharp and insignificantly directed upward (Figs 8, 11); second conjunctival appendages of aedeagus apically strongly recurved (Fig. 14); opening of the male genital capsule with short and broad sharpened teeth at the inner margins as in *P. lisi*; proctiger straight on its apical margin as in *P. australis*.

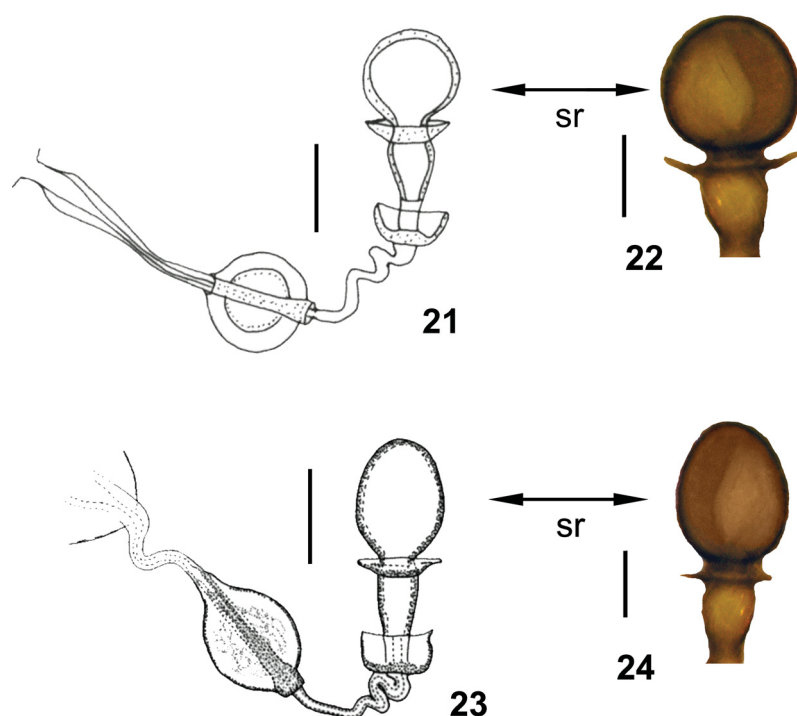
Differential diagnosis of female. Spermathecal seminal receptacle rounded as in *P. australis*.

Note. For a detailed description of the species, see LIS (1995).

Distribution (Fig. 25). Indonesia (Java) (LIS 1995).



Figs 14–20. Male genital structures. 14–16 – second conjunctival appendages. 17–18 – opening of the pygophore. 19–20 – proctiger. 14 – *Prolactistes jani* (J. A. Lis, 1995); 15, 17, 19 – *P. australis* J. A. Lis, 2001; 16, 18, 20 – *P. lisi* (Magnien, 2014), arrows indicate the differences between studied species. Scale bars = 0.1 mm (Figs 14–16), 0.5 mm (Figs 17–20).



Figs 21–24. Female spermatheca. 21–22 – *Prolactistes australis* J. A. Lis, 2001; 23–24 – *P. lisi* (Magnien, 2014). Lettering: sr – seminal receptacle of spermatheca. Scale bar = 0.1 mm. (Fig. 21 from LIS (2001), modified; Fig. 23 from MAGNIEN (2014), modified).

***Prolactistes lisi* (Magnien, 2014), comb. nov.**

(Figs 10, 13, 16, 18, 20, 23–24)

Paraethus lisi Magnien, 2014: 140.

Material examined. AUSTRALIA: NORTHERN TERRITORY: 1 ♂, N.T. Mataranka Hmstd., 8 km E of Mataranka, 8 May 1983, J. T. Doyen (ANIC). INDONESIA: AMBON ISLAND: 1 ♀, Ambon I., 70 m, 13.v.1960, A. M. R. Wegner, Coll. Bishop Museum (BPBC); 1 ♂, Ambon I., Waai, 4.xii.1960; A. M. R. Wegner, Coll. Bishop Museum (BPBC, IBUO).

Differential diagnosis of male. Blade of paramere separated from the outer lobe by a very small incision and its upper edge blunt and directed downward (Figs 10, 13); second conjunctival appendages of aedeagus apically rectangular (Fig. 16); opening of the male genital capsule with blunt teeth at the inner margins (Fig. 18); proctiger narrower than that of *P. australis*, about 1.3–1.4 times longer than wide, slightly incised on its apical margin (Fig. 20).

Differential diagnosis of female. Spermathecal seminal receptacle elongated (Figs 23–24).

Note. For a detailed description of the species, see MAGNIEN (2014).

Distribution (Fig. 25). Australia (Northern Territory) (first exact record); Indonesia (Ambon Island) (new country record).

Key to species of *Prolactistes*

- 1 Paraclypeus with a row of setigerous punctures including 10–11 peg-like setae; ocular index 3.20–3.40; ocellar index 4.4–4.8; pronotum about 1.6 times as broad as long; paramere as in Figs 8 and 11; second conjunctival appendage of the aedeagus strongly recurved apically as in Fig. 14. ... *P. jani* (J. A. Lis, 1995)
- Paraclypeus with a row of setigerous punctures including only 6–9 peg-like setae; ocular index 2.70–3.10;

ocellar index 3.0–4.5; pronotum about 1.8 times as broad as long; paramere not as in Figs 8 nor 11; second conjunctival appendage of the aedeagus apically slightly recurved or almost rectangular (Figs 15–16). 2

- 2 Paramere as in Figs 9 and 12; second conjunctival appendage of the aedeagus apically slightly recurved (Fig. 15); opening of the male genital capsule with elongated sharpened tooth at each side of the inner margin (Fig. 17); proctiger straight on its apical margin (Fig. 19); spermathecal seminal receptacle rounded (Figs 21–22). *P. australis* J. A. Lis, 2001
- Paramere as in Figs 10 and 13; second conjunctival appendage of the aedeagus apically almost rectangular (Fig. 16); opening of the male genital capsule with a small rounded tooth at each side of the inner margin (Fig. 18); proctiger slightly incised on its apical margin (Fig. 20); spermathecal seminal receptacle elongated (Figs 23–24). *P. lisi* (Magnien, 2014)

Discussion

Prolactistes was originally erected as a genus morphologically similar to *Lactistes* Schiødte, 1848, due to its anterior tibiae conspicuously produced beyond the point of tarsal insertion and the peritreme modified into a claw-like process (LIS 2001). However, both genera differ in their type of head chaetotaxy, i.e., in species of *Prolactistes* hair-like and peg-like setae are present, whereas only hair-like setae occur in species of *Lactistes*.

On the other hand, *Prolactistes* and *Paraethus* also share several morphological characters, e.g., the elongated body, head submargins with a row of setigerous punctures bearing peg-like and hair-like setae, posterior tibiae and femora flattened, and, most importantly, peritremal surface

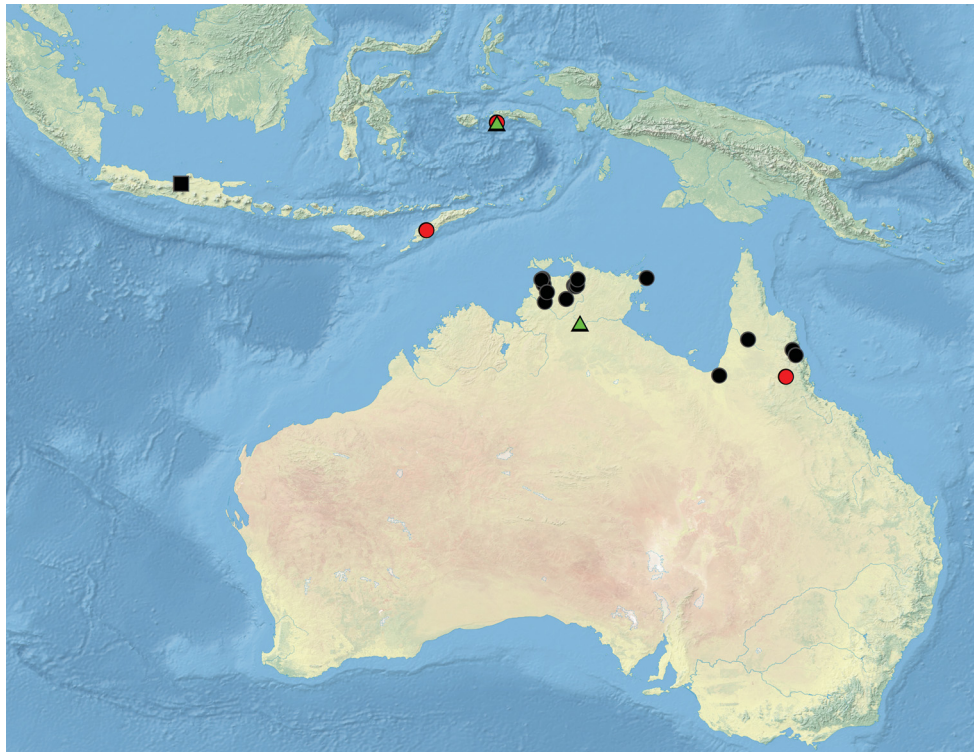


Fig. 25. Known localities of the three species of the genus *Prolactistes*. *Prolactistes jani* (J. A. Lis, 1995), black square; *P. australis* J. A. Lis, 2001, circles (black – literature data, red – new records); *P. lisi* (Magnien, 2014), triangle (green – new records).

Table 1. Comparison of morphological characters of the three species of the genus *Prolactistes*. J. A. Lis, 1994.

Characters	<i>P. jani</i>	<i>P. lisi</i>	<i>P. australis</i>
Body length (mm)	7.25–7.55	6.40–7.00	6.68–8.02
Clypeus	free, tapering apicad	almost free, tapering apicad	free, tapering apicad
Number of setigerous punctures on paraclypeus (hair-like setae + peg-like setae)	12–13 (2–3 + 10–11)	11–12 (3–4 + 8)	10–12 (3 + 7–9)
Number of setigerous punctures on lateral margin of pronotum	10–12	12	11–16
Number of setigerous punctures on costal margin	3–4	1 (female), 5 (male)	2–5 (usually 4)
Ocular index	3.20–3.40	2.86–3.08	2.70–3.10
Ocellar index	4.40–4.80	3.00–4.10	3.80–4.50
Interocellar distance	5.50–8.00	6.00–6.60	5.00–6.30
2 nd /3 rd antennal segment length ratio	0.94–1.00	1.00–1.03	0.86–0.97
Rostrum reaching	posterior coxae	posterior coxae	posterior coxae (sometimes surpassing them)
Pronotum width/length	1.60	1.80	1.80
Number of stout spines on dorsal margin of fore tibia	10–11	10–11	9–10

provided with a claw-like process (Figs 4, 5). However, they differ in the shape of the head and its margins (head is parabolic and its margins normally developed in *Paraethus* (Fig. 6), whereas it is expanded in front of the eyes, with its margins flattened and slightly upcurved in *Prolactistes* (Fig. 7). Additionally, the outer part of anterior tibia is strongly produced beyond the point of tarsal insertion in *Prolactistes* (Fig. 2), while it is normally developed in *Paraethus* (Fig. 3).

Importantly, a peritreme modified into a claw-like process is the only shared character of *Prolactistes*, *Paraethus* and *Lactistes*, but it can be found also in some other Old World genera of two cydnid subfamilies, Cephalocteinae and Cydninae (LINNAVUORI 1993, LIS 1994). Therefore, we regard this character as having evolved independent-

ly in all those genera rather than being inherited from a common ancestor.

Species of the genus *Prolactistes* studied herein are morphologically very similar, and usually hard to separate from each other based only on external morphological characters (Table 1), but their male and female genitalia are diagnostic (see differential diagnosis of each species and the key). Closely related burrower bug species recognizable only on the basis of female or male genital structures (e.g., spermatheca, parameres, the opening of genital capsule, the second conjunctival appendages, the pygophore) are not rare within different subfamilies of Cydnidae, including Cydninae (e.g., LIS 1993, 2000; LIS & LIS 2016; LIS et al. 2014) and Sehirinae (KERZNER 1976, GAPON 2018).

It is somewhat uncertain whether the differences in the shape of the opening of the male pygophore (Figs 17–18), the shape of the second conjunctival appendages (Figs 15–16), the proctiger (Figs 19–20), and the shape of the spermathecal seminal receptacle (Figs 21–24) of *P. australis* and *P. lisi* represent taxonomic characters of specific value, or they are only a case of intraspecific morphological variability. Nevertheless, paramere shape appears to be a reliable character, we decided to recognize *P. lisi* as a species separate from *P. australis* until more specimens of both taxa are available for study.

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